ENHANCED POSITION LOCATION REPORTING SYSTEM (EPLRS)

Army ACAT II Program

Total Number of Systems:	4417
Total Program Cost (TY$):	$930M
Average Unit Cost–Radio (TY$):	$28K
Average Unit Cost–NCS (TY$):	$800K
Full-rate production:	2QFY97

Prime Contractor

Hughes

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2010

For successful implementation of the ***Joint Vision 2010*** operational concepts of ***dominant maneuver***, ***precision engagement***, ***focused logistics,*** and ***full-dimensional protection***, enhanced command and control is essential. In anticipation of significant operational advantages, the Army recognizes that enhanced tactical communications is the first step towards achieving these goals. The Enhanced Position Location Reporting System (EPLRS) is a digital radio, and with its Net Control Station (NCS), comprises a network of individual radios that provide secure, electronic warfare resistant data communications primarily in support of the Army Battle Command System. Additionally, for the near term, EPLRS will play a vital role in the Army's modernization efforts as the communications backbone of the Tactical Internet, a critical component of the Digital Battlefield for brigade and below forces.

Major components of the EPLRS system are the EPLRS radio and NCS, which establishes and controls the network of individual radios. Each radio in the network has unique time slots during which it can transmit to both NCS and other radios. This capability is referred to as Time Division Multiple

Access, and allows NCS to process the transmissions of communications, as well as position, navigation, and identification services. The basic EPLRS radio consists of a receiver-transmitter, processor, and one of two interchangeable input/output devices. Each EPLRS radio is individually identifiable to NCS, and performs transmission (including relay), reception, and message processing functions for the situational-awareness data base.

The current EPLRS system includes Very High Speed Integrated Circuit modules that increase the data rate to 56 kilobits per second and a redesign of most of the remaining modules from the System Improvement Program (SIP). NCS has been downsized from a shelter on a 5-ton truck to a rigid-wall shelter on a High Mobility Multi-Purpose Wheeled Vehicle. The next generation of EPLRS, the Value Engineering Change Proposal, represents a departure from the Military Specification design approach to better integrate commercial parts and practices and improve reliability while reducing cost. The new radio will be form, fit, and function compatible with the SIP version, but reduce the current eleven circuit card assemblies to three and eliminate fifteen interconnections. It should also offer data rates in excess of 100 kbps (vs. 3.6 kbps for the SIP at the IOT&E), increased network efficiency, and greater flexibility in setting up communication paths.

A typical EPLRS employment is in support of a brigade area that covers 20 by 30 kilometers, and includes approximately 170 EPLRS radios and one NCS. A division contains four of these "communities," one for each brigade and one for the division rear. The concept of employment for a brigade on the Digital Battlefield is over an area that covers 40 by 70 kilometers, and a battalion task force with brigade slice during a recent Digitization event was equipped with 158 EPLRS radios.

BACKGROUND INFORMATION

The origin of EPLRS can be traced back to July 1973, when the Department of the Army accepted an invitation from the Commandant of the Marine Corps to participate in the Position Location Reporting System Program. The Army initiated the Army Data Distribution Program as the Position Location Reporting System (PLRS) and Joint Tactical Information Distribution System (JTIDS) Hybrid Program in 1979. The PLRS and JTIDS Hybrid Required Operational Capability document, dated October 1986, contains the original requirements for EPLRS.

PLRS OT III was conducted in 1988, and many problems were identified. Solutions were implemented and verified, and a full-scale production was awarded in time to equip Marine Corps forces participating in the Persian Gulf War. Although reference position limitations were revealed when survey teams had difficulty keeping up with the rapid rate of advance into Kuwait, the Marine Corps reported PLRS as having significantly enhanced their Gulf War performance in both situational awareness and free-text communications.

EPLRS completed IOT&E II in December 1996. The purpose of IOT&E II was to determine the operational effectiveness and suitability of the downsized EPLRS NCS and the EPLRS SIP radio. IOT&E II had two phases. Phase 1, conducted at Electronic Proving Ground, Fort Huachuca, AZ, included two downsized NCSs, 15 SIP radios, and 103 Very High Speed Integrated Circuit radios. Two heliborne jammers replicated a moderate-to high-electronic warfare environment. Phase 2 of EPLRS IOT&E was a three-day training exercise at Ft. Hood, TX, in conjunction with the Force XXI brigade field training exercise, and included approximately 300 Very High Speed Integrated Circuit radios in a network controlled by one downsized NCS. Neither phase of IOT&E addressed the Army Tactical Command and Control System interoperability. The evaluation from this test concluded that EPLRS

downsized NCS and that SIP radios are effective in communicating relatively short messages and position/navigation information.

From February 1996-March 1997, EPLRS (Tactical Internet) testing was conducted at the Electronic Proving Ground and Ft. Hood, TX, in conjunction with the Task Force XXI Advanced Warfighting Experiment. Although the level of digital connectivity observed during this experiment was low, and judged not suitable for tactical operations, the effort contributed significantly to the redesign of the Tactical Internet architecture that will be employed on the Digital Battlefield.

EPLRS, in its role as a key component of the Tactical Internet, participated in the Force XXI Battle Command, Brigade and Below (FBCB2) Development Test 1 in May 1998 at the Electronic Proving Ground, and the FBCB2 Limited User Test at Ft. Hood, TX, in August 1998. The Development Test 1 employed 47 EPLRS radios and included barrage and localized jamming.

TEST & EVALUATION ACTIVITY

All test and evaluation activities involving the EPLRS radio are within the framework of the Tactical Internet and are completely aligned with the FBCB2 Program. The primary activity during this period was the evaluation of Tactical Internet performance during the August 1998 Limited User Test for FBCB2.

TEST & EVALUATION ASSESSMENT

The data from IOT&E II and previous operational tests for EPLRS were sufficient to conclude that the current version of EPLRS, the downsized NCS, and the SIP radio effectively disseminate short data messages such as those used in the air defense application. The data were not sufficient to demonstrate effectiveness for long messages. Results from Army Tactical Command and Control System testing indicate that approximately 15 percent of its traffic included messages longer than those examined during IOT&E. While the jamming environment did reduce the message-completion rate, the system performed well overall. IOT&E II also provided sufficient data to confirm that EPLRS is operationally suitable. Testing of the new Value Engineering Change Proposal radio should include longer messages at higher data rates with interoperable host systems.

In its Tactical Internet role, and in conjunction with the Single Channel Ground and Airborne Radio System radio and Internet Controller, the data collected during the 1997 Force XXI Advanced Warfighting Experiment indicated that the Tactical Internet message completion rate and speed-of-service were below expectations. Development Test 1 results demonstrated significant improvements over experimental results: Command and control message completion rates increased from approximately 30–80 percent, and speed of service decreased from approximately 3 minutes to less than 4 seconds. Although these results were reflective of performance in a technical environment, similar improvements were also observed during the more operationally realistic LUT, albeit with a smaller network than in the Advanced Warfighting Experiment. Whether these results are “scalable” from a battalion task force to a brigade task force will be examined during the FBCB2 Limited User Test/Force Development Test and Experimentation in April 2000.

Testing and evaluation for the FBCB2 Program in FY00–FY02 will determine whether the EPLRS portion of the Tactical Internet can meet the requirements of the Digital Battlefield.